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PERMANENT GLASS COLOR STANDARDS FOR MAPLE SIRUP

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AGRICULTURAL RESEARCH ADMINISTRATION  
UNITED STATES DEPARTMENT OF AGRICULTURE

## PERMANENT GLASS COLOR STANDARDS FOR MAPLE SIRUP<sup>1</sup>

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Color has long been an important factor in grading maple sirup<sup>4,5</sup>. The United States Department of Agriculture's color standards for maple sirup, designated as "Light Amber," "Medium Amber," and "Dark Amber," have heretofore been represented by solutions of caramel in glycerin, prepared in accordance with Balch's<sup>6</sup> revised spectrophotometric specifications for Bryan Color Numbers 6, 8, and 10. The Department of Agriculture has supplied limited numbers of these standards each year for Federal and State inspection of maple sirup. Unfortunately, caramel-glycerin solutions are not highly stable in respect to color, and their use as color standards has not been entirely satisfactory.

To improve the grading of maple sirup, this Department has recently developed a simple color comparator fitted with permanent standards of colored glass. The purpose of this publication is to describe the comparator and announce its availability.

Before glass color standards could be developed, it was obviously necessary to decide on a suitable standard thickness or layer depth of sirup and a suitable sample container, for use in grading for color. Preliminary tests indicated that a square 2-ounce bottle having an internal thickness of 1.24 inch (31.5 mm.) met the requirements for a satisfactory container. The advantages of this bottle are: (1) it is inexpensive and available commercially; (2) the relatively large thickness of layer facilitates precise grading, since sirups of standard color are widely spaced on a color scale when viewed in this thickness; and (3) the square shape provides a field of view of uniform thickness and uniform color, a feature which has not been possible with the cylindrical containers used heretofore.

<sup>1</sup> REPORT OF A STUDY IN WHICH CERTAIN PHASES WERE CARRIED ON UNDER THE RESEARCH AND MARKETING ACT OF 1946.

<sup>2</sup> EASTERN REGIONAL RESEARCH LABORATORY, PHILADELPHIA 18, PENNSYLVANIA.

<sup>3</sup> PRODUCTION AND MARKETING ADMINISTRATION, FRUIT AND VEGETABLE BRANCH, WASHINGTON 25, D.C.

<sup>4</sup> 'UNITED STATES STANDARDS FOR TABLE MAPLE SIRUP,' PRODUCTION AND MARKETING ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE. ISSUED FEBRUARY 7, 1940.  
FOR

<sup>5</sup> 'UNITED STATES STANDARDS FOR MAPLE SIRUP/REPROCESSING,' PRODUCTION AND MARKETING ADMINISTRATION. ISSUED FEBRUARY 7, 1940.

<sup>6</sup> R. T. BALCH. IND. ENG. CHEM. 22, 255 (1930).

A layer depth of 1.24 inch (31.5 mm.) has accordingly been adopted as standard. Amber glasses have been found which, when ground and polished to thickness specifications, have colors that duplicate closely the colors of the freshly prepared standard caramel-glycerin solutions in the standard depth.

The new color comparator (Figures 1 and 2) is an all-metal box having dimensions 8-1/2 by 2 by 3 inches, divided by thin partitions into five equal compartments, each of which has two 1-1/4 inch square windows. The glass color standards (Light Amber, Medium Amber, and Dark Amber) are permanently cemented on a shelf against the front windows in compartments 1, 3, and 5. Three bottles filled with clear glycerin-water solutions (referred to as "blanks") are placed in back of the glass standards. Empty bottles are provided for maple sirup samples. A bottle containing sirup to be graded is placed in either compartment 2 or 4, so that it will be between adjacent standards. To assist in the grading of cloudy sirups, three bottles containing suspensions of bentonite in glycerin-water solutions are available. These are referred to as "Cloudy A," "Cloudy B," and "Cloudy C," corresponding to varying degrees of cloudiness permitted in the different grade classifications for table maple sirup.

The following procedure is used in grading maple sirup with this comparator.

- (1) The three clear blanks are placed in back of the glass standards in compartments 1, 3, and 5.
- (2) Maple sirup to be graded is poured into a clean dry bottle, which is then placed in compartment 2 or 4.
- (3) The comparator is held at a convenient distance from the eye and viewed in diffuse daylight, and the color classification of the sirup is determined by comparison of the sample with the standards. Switching the sample from compartment 2 to 4, or vice versa, may be necessary.

If a sample is equal to the Light Amber standard in hue, or not so red (that is, yellower), the color is classified as Light Amber; if perceptibly redder than the Light Amber standard in hue, but not redder than the Medium Amber standard, the color is classified as Medium Amber; if perceptibly redder than the Medium Amber standard, but not redder than the Dark Amber standard, the color is classified as Dark Amber; if redder in hue than the Dark Amber standard, the color is classified as U. S. Grade F or substandard. It is emphasized that hue (redness, yellowness) is the attribute of color to be considered in this grading.

If the sirup is appreciably cloudy because of suspended material, its brightness will be lowered and its color classification may be difficult to determine, particularly if its hue is near that of one of the standards. In such cases, the color classification of either Table Maple Sirup or Maple Sirup for Reprocessing is more easily determined if the clear blank is replaced by a Cloudy A, Cloudy B, or Cloudy C suspension.

The comparator, complete with glass standards, three clear blanks, three cloudy suspensions, and empty bottles is now commercially available. Information on where it may be purchased, and additional details concerning it may be obtained from the Fruit and Vegetable Branch, Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.; or from the Eastern Regional Research Laboratory, Philadelphia 18, Pennsylvania.

## Legends

Figure 1. Color comparator for maple sirup, showing the cloudy suspensions, the mounted glass color standards, and the blank solutions.

Figure 2. Color comparator for maple sirup, showing blank solutions in place behind the mounted glass color standards, and a sample of maple sirup to be graded.

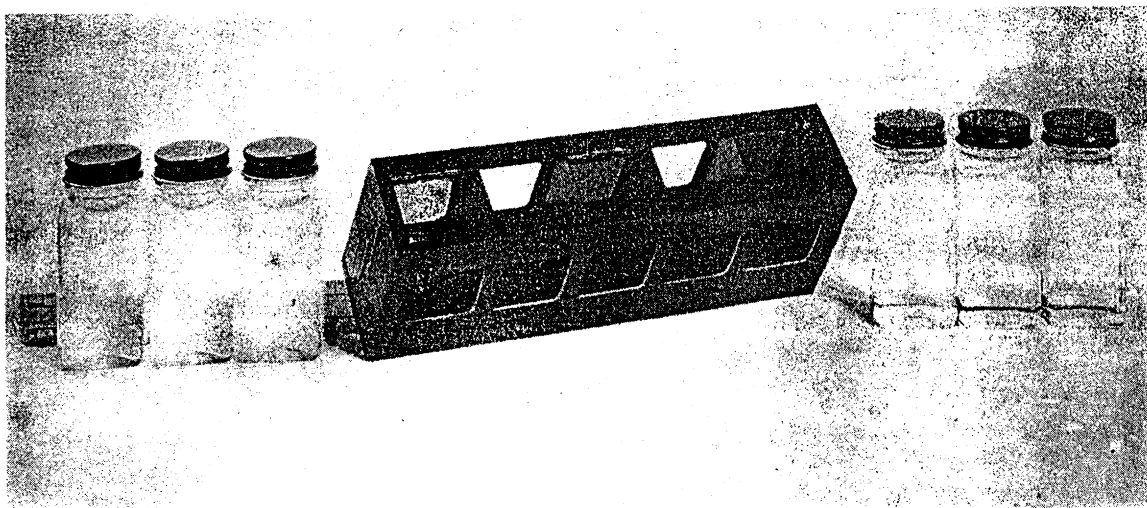


FIGURE 1

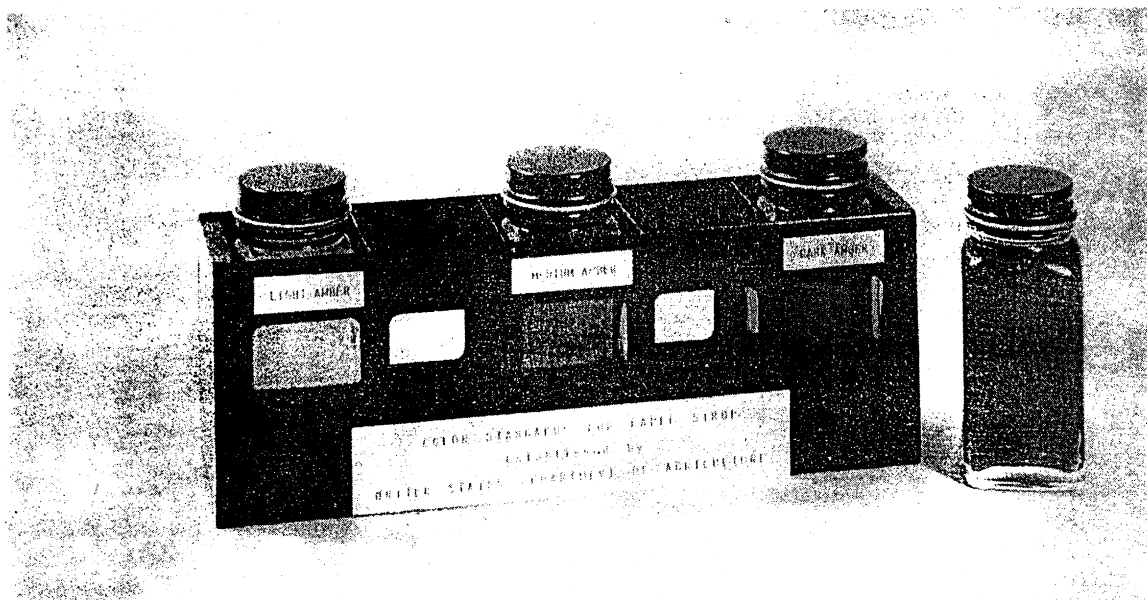


FIGURE 2